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COMPLETE SPECIFICATION.

Improvements in Closure Caps for Tumblers, Jars and other Receptacles.

- I, HARRY INGRAM, of 1901, Jacob Street, Wheeling, County of Ohio, State of West Virginia, United States of America, a Citizen of the United States of America, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—
- My invention relates to closure caps for tumblers, jars and other receptacles. It has for one of its objects to provide the closure with an improved vent valve responsive to internal pressure so that upon an increase of pressure within the receptacle the valve will be opened for escape of excess of pressure and then be automatically sealed or closed under normal conditions whether the abnormal internal pressure be created during the processing or sterilising operations to which contents of the receptacles are at times subjected, or whether from other causes air is trapped in the receptacles beneath the closure cap and for which it is desirable to provide a vent so as to relieve the cap from such internal pressure as might be calculated to impair the effective seal designed to be afforded by the closure cap. The improved features in the vent valve operative under the conditions mentioned will be hereinafter indicated for various embodiments of the invention. Another object is to provide a supplemental closure cap serviceable as a service cap after removal of the sealing cap so as to provide the housewife with a conveniently manipulated service cap to protect the original contents of the receptacle, or other products which may replace the original contents and thus be serviceable to the housewife in providing receptacles for various articles. Another object is to provide an effective seal between the external cap and mouth of the receptacle and also between the valve and cap at the point where the vent is provided for escape of excess internal pressure.
- It has previously been proposed to form a receptacle closure cap with an outlet hole and a vent valve held beneath the hole by a perforated disc, the cap
- having a limited flexure relative to the valve for relieving excess internal pressure.
- The invention consists of a closure for tumblers and other receptacles comprising an external closure cap formed with a vent opening, an internal service cap, a seat formed within the receptacle for supporting the service cap and a vent-valve disposed within the receptacle to contact with part of the service cap and also with the under surface of the closure cap about the vent opening, the closure cap having a limited flexure about the vent opening for relief of excess internal pressure.
- In the accompanying drawings.
- Fig. 1 is a side elevation of a tumbler, partly in section, showing one embodiment of the invention, the parts being in their initial position, prior to the vacuum sealing of the receptacle.
- Fig. 2 is a side elevation of the upper portion of a receptacle, in section, on an enlarged scale showing the parts after the vacuum sealing process and a modification of the vent-valve.
- Fig. 3 is a detail sectional view of a portion of the external cap and its sealing gasket.
- Fig. 4 is a plan view of the external cap shown in Fig. 1.
- Fig. 5 is a plan view of Fig. 1 with the external cap removed and looking down upon the internal service cap.
- Fig. 6 is a view similar to Fig. 2 with a modification of the vent-valve.
- Fig. 7 is a view similar to Fig. 6 showing another modification in the vent-valve.
- Fig. 8 is a sectional view of parts of the service-cap and external sealing cap and showing a further modification in the vent-valve.
- Fig. 9 is a plan view of Fig. 8 with closure cap omitted.
- Fig. 10 is a section through a portion of the top sealing cap and the service cap showing modification of the vent-valve.
- Fig. 11 is a plan view of the service cap and vent-valve of Fig. 10.
- In the accompanying drawings there is illustrated in Figs. 1 and 2 of the

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drawing a tumbler or jar 1 of a conventional form having the outer surface of its walls straight or slightly tapering downwardly and inwardly with a substantially smooth surface, and in Figs. 6 and 7 is illustrated a jar or receptacle 2 having a contracted neck 3 with an annular groove 4 formed in the outer face of its upper portion, although the tumbler or jar may be otherwise formed. It is preferably made of a vitreous material, such for instance as glass, although it may be made of other suitable material, and in the different forms there is illustrated a shoulder 5 formed on the inner face of the neck or mouth of the receptacle to form a seat for a service cover or cap 6 that is of an improved form, as hereinafter more particularly described. The tumbler or jar or receptacle is provided with a sealing cap or cover 7 which is preferably formed of relatively thin aluminium, or formed of other suitable material possessing a greater or less degree of flexibility so that it may function with a degree of flexure as hereinafter indicated. The sealing cap or closure 7 is formed practically at its periphery, facing downwardly, with a substantially inverted V-shaped groove 8 from which extends a downwardly and outwardly inclined portion 9, from which a portion 10 extends downwardly and from the lower part of which extends a downwardly and inwardly inclined portion 11 from the end of which extends a flange 12, the portions 9, 10, 11 and 12 constituting a depending flange or apron to the closure cap. A sealing annular gasket 13, of rubber or other suitable material is formed at its upper end with an upwardly and inwardly beveled face 14 designed to bear against the under side of the upper inclined portion 9 of the closure cap so that the upper edge of the beveled portion 14 will fit within the inverted V-shaped groove 8 of the closure cap; and the bottom of the gasket 13 is formed with a downwardly and outwardly inclined bevelled face 15 with its lower outer edge normally resting upon the inclined portion 11 of the apron portion of the cap as clearly indicated in Fig. 3 of the drawing. This Fig. 3 illustrates the position of the sealing gasket 13 in relation to the adjacent parts of the closure cap prior to the cap being brought to the position illustrated in Fig. 1 of the drawing. As the cap 7 is pressed down into position over the neck of the tumbler or jar the inner face of the top of the cap is brought into position so as to rest directly upon the lip 13a of the tumbler or jar or receptacle and the rubber gasket is deformed from its shape shown in Fig. 3 into the shape shown in Figs. 1 and 2 of the drawing, with the upper edge of the gasket fitting in the inverted V-shaped groove 8 higher than and to one side of the lip of the receptacle on which the cap is seated and with the inner face of the gasket snugly hugging the outer wall surface of the tumbler, jar or receptacle so as to make an effective seal at this point and prevent the entry of any of the products of the receptacle between the inner surface of the cap and its seat upon the lip at the mouth of the receptacle as indicated clearly in Figs. 1, 2, 6 and 7 of the drawings. This efficient seal by the gasket results from the bevelled upper and lower faces of the gasket described. This sealing gasket and the vent-valve hereinafter described have a joint co-operation with each other to preserve the effective seal made possible by the sealing gasket of the closure cap by reducing to the minimum liability of pressure beneath the sealing cap lifting the cap to an extent to impair the effective sealing. This tendency is minimized by providing for venting air trapped beneath the closure cap in applying the cap to its sealing position; also by relieving excess pressure beneath the cap generated in subsequent vacuum treatment or, processing of the receptacle and its contents or from external causes after the cap has been applied. The more effective the seal afforded by the closure cap sealing gasket the greater the liability of trapping air beneath the cap in application of the cap. In bringing the cap to the position shown in Fig. 1 of the drawing air is trapped beneath the cap in compression of the sealing gasket 13 to bring it to the condition there illustrated. The pressure of the trapped air against the under face of the cap flexes the cap upwardly at its centre so as to uncover a vent opening 16 formed in the closure cap and permit the trapped air to escape and upon its escape the recoil or reflex of the cap restores it to normal position so as to seat on the valve and close the vent opening in the cap. If an excess of pressure from any cause, is again created beneath the closure cap the cap around the vent opening is again flexed so as to uncover the opening and permit the excess pressure to escape and the vent opening to be again closed. This occurs automatically and periodically as often as the pressure beneath the cap increases sufficiently to flex the cap and uncover the vent opening. The very efficient seal due to the tapered edge formation of the gasket for

the closure cap and the sealing contact of the cap with the top edge or rim of the tumblers or container prevent leakage of air or contents between the rim of the container and the cap and relief from excess pressure beneath the cap must be through the automatically controlled vent opening in the cap and such automatic control of excess pressure beneath the cap prevents excess pressure lifting the cap along its sealing gasket, which if permitted would to that extent impair the efficiency of the seal. It thus appears that there is a relation between the tapered formation of the cap sealing gasket and the automatic pressure escape control. It may be desirable at times to subject the container and its contents to a "vacuum sealing" well known in this particular art and also to a sterilising or process treatment familiar to the skilled in this art. In both of these treatments, pressure is generated within the container and the excess pressure must be relieved, otherwise the closure cap is likely to be blown off or moved from its seat. This excess pressure will be relieved and its detrimental effects prevented, by the co-action of the cap, tapered sealing gasket and automatic pressure relief valve before described, the action being substantially that described for relieving the pressure of air trapped in placing the closure cap in sealing position. Another advantage derived from the vent relief valve and the tapered sealing gasket of the cap, is that under normal conditions the vent valve when seated prevents any extraneous fluids from entering the container through the valve controlled vent opening in the closure cap. One form of vent valve as illustrated in Fig. 1 of the drawing consists of a disc 17, say of rubber, seated upon a knob 18, and cemented or otherwise secured thereto, the knob being illustrated as formed as a part of the service cap 6 which may be formed of glass as indicated or other suitable material. This knob not only serves as a seat for the vent valve, but also serves as a means, or finger-grip, for manipulating the service cap after the sealing or closure cap has been removed for permitting access to the contents of the receptacle. This knob may be of polygonal or any desired configuration in cross section but is illustrated as cylindrical in form. The peripheral portion of the service cap is preferably formed with an offset or shoulder 19 to seat upon the shoulder 5 on the inner face of the receptacle. Any excess of pressure generated within the body of the receptacle beneath the service cap will find its

way around the walls of the service cap into the space beneath the sealing or closure cap and exert pressure against the under face of the cap so as to lift it from its seat upon the vent valve and permit the excess pressure to escape through the vent opening 16. If pressure be generated within the receptacle between the service cap and the sealing cap by external heat, that pressure will flex the central portion of the sealing cap so as to lift it above the vent-valve and permit such pressure to escape through the vent opening 16 and the sealing cap will automatically reseal upon the vent-valve when the pressure beneath it lowers and thus the vent-valve is caused to serve a useful function whether it is actuated from the heat imparted to the contents of the receptacle during the sterilising or processing operation, or whether it results from external heat creating pressure between the service cap and sealing cap, or otherwise, in the ordinary use of the receptacle containing its sealed contents.

In Fig. 2 of the drawing the vent-valve 17a is illustrated as formed with a plug 20 designed to fit within the vent aperture 16 which corresponds to the like aperture shown in Fig. 1 of the drawing the vent-valve 17a being seated on the top of the knob 18 of the service cap 6.

In Fig. 6 of the drawing the vent opening 16 in the sealing or closure cap 7 is illustrated as formed with a depending collar or flange 20b around which is fitted or seated an annular elastic vent-valve gasket 17b. This gasket before the closure cap is finally seated, appears as illustrated in Fig. 8 of the drawing with upper and lower edges 19c and 20c, bearing respectively against the lower surface of the closure cap and upper face of the knob 18 and forming practically knife edges that facilitate compression of the gasket and a more effective seal when the closure cap is finally seated the gasket under that condition appearing as shown in Fig. 6 of the drawing.

In Fig. 10 of the drawing the elastic vent-valve gasket 17c is shown as in the form of a tube or tubular nipple having an upper beveled or knife edge, 19a and a lower beveled or knife edge, 20a. This elastic vent-valve encircles the knob 18 and the upper beveled edge 19a bears against the under face of the closure cap 7 and the lower beveled edge 20a bears against the top of the service cap 6 as illustrated in Fig. 10 and when the closure cap is brought into final sealing position, the vent-valve gasket assumes the position shown in Fig. 7 of the drawing with the side wall of the gasket

slightly bulged and the upper and lower edges of the gasket making an effective seal with the under face of the closure cap and top face of the service cap 6 as illustrated in Fig. 7 of the drawing. In addition to serving as a vent-valve for relieving excess of pressure beneath the closure cap in the manner before stated, the tubular vent-valve also serves to afford a firmer and non-slipping finger grip for manipulating the service cap upon removal of the closure cap. The elastic gasket in each of the forms illustrated and described serves as a vent-valve functioning to relieve excessive pressure beneath the closure cap as herebefore described and for automatically closing the vent upon reduction of internal pressure by reseating of the closure cap upon the vent-valve gasket in the manner before stated.

While it is preferred to employ the service cap and the elastic vent-valve with a closure cap of the character illustrated and described in which the sealing of the closure cap is effected by the elastic sealing means between the closure cap and exterior wall of the jar or container because of the resulting advantages, it will be understood that some features of the invention, for instance, the pressure relief vent-valve and the service cap features may be used with the well known form of screw threaded attached closure cap which because of its well known character need not be shown and described in detail.

The apron of the closure cap may be formed with a flexible tab 21 (Figs. 1 and 4) adapted to be grasped by the fingers to rupture the apron and break the seal in removal of the closure cap. The finger-piece 18 may have a frictional-grip facing.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A closure for tumblers and other receptacles comprising an external closure cap formed with a vent opening, an internal service cap, a seat formed within the receptacle for supporting the service cap and a vent-valve disposed within the receptacle to contact with part of the service cap and also with the under surface of the closure cap about the vent opening, the closure cap having a limited flexure about the vent opening for relief of excess internal pressure.

2. A closure as claimed in claim 1, wherein a finger-piece is disposed on the service cap for manipulation of said cap on removal of the closure cap.

3. A closure as claimed in claim 2, wherein a tubular elastic valve is disposed on the finger-piece with its upper edge adapted to contact with the under surface of the closure cap.

4. A closure as claimed in claim 1 or 3, wherein the portion of the valve about the vent opening is formed with a tapered edge.

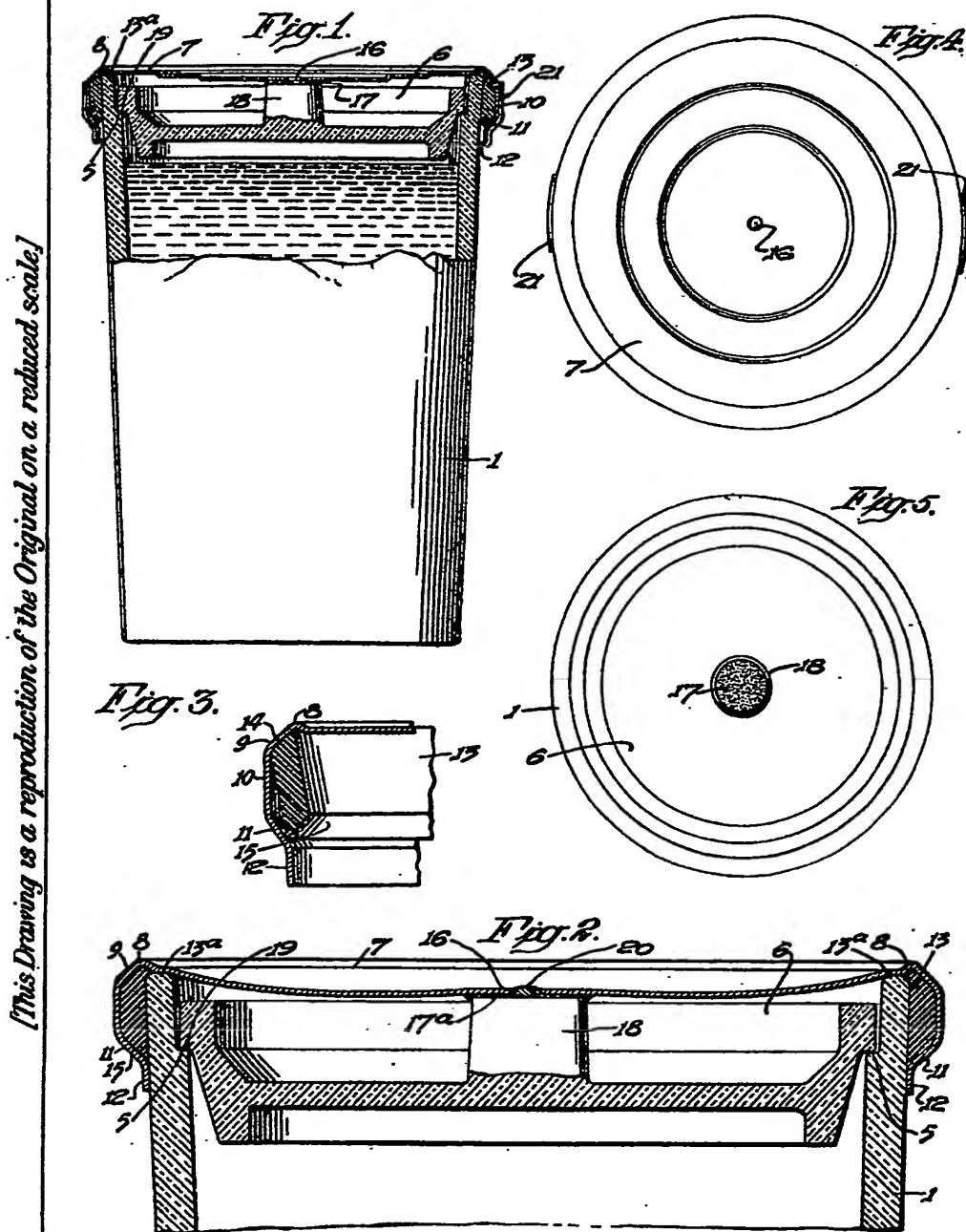
5. A closure as claimed in claim 2, wherein the finger-piece is provided with a frictional-grip facing.

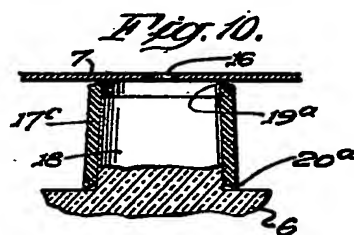
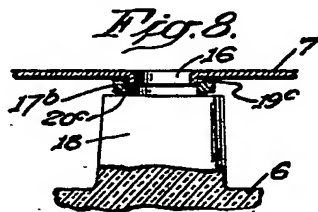
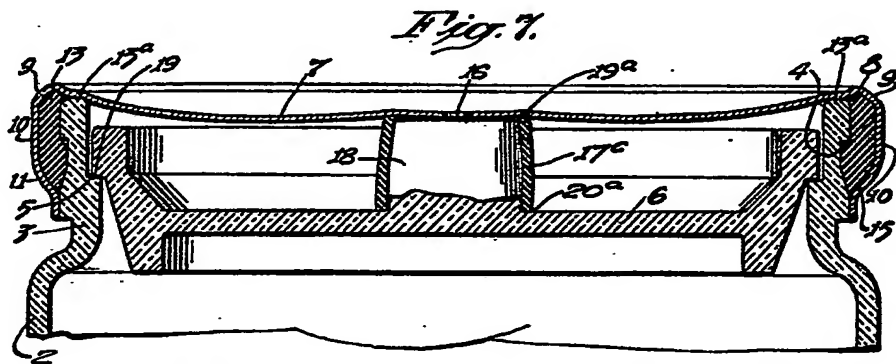
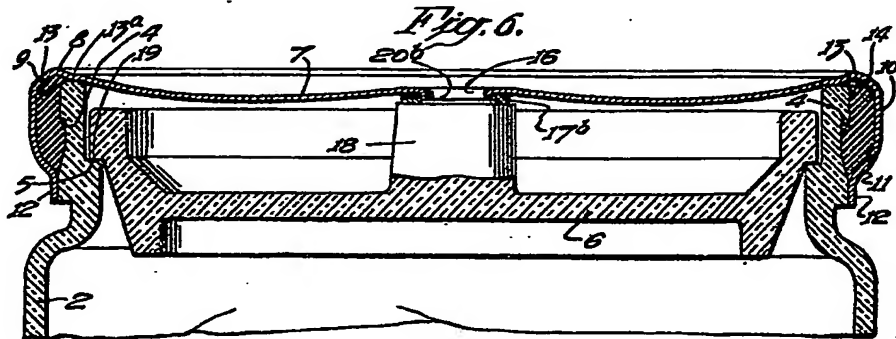
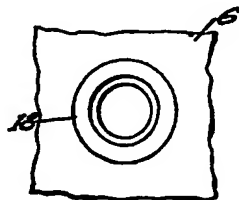
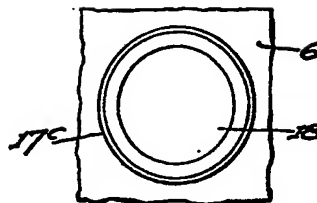
6. Closures for tumblers and other receptacles substantially as described and shown in the annexed drawings.

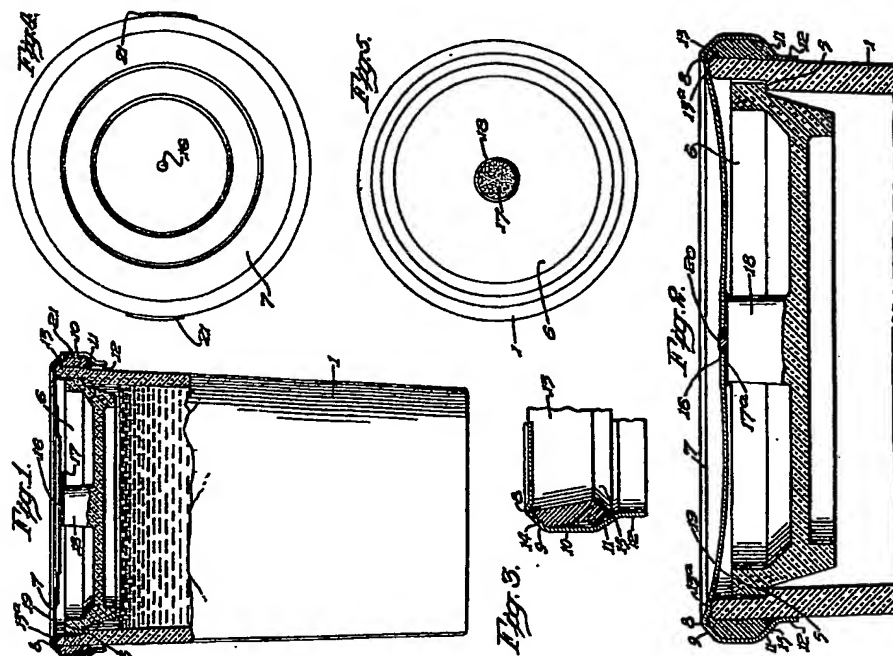
Dated this 16th day of June, 1931.

DICKER, POLLAK & MERCER,
Chartered Patent Agents,
20 to 23, Holborn, London, E.C.1,
Agents for the Applicant.

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*Fig. 9.**Fig. 11.*



[This Drawing is a reproduction of the Original on a reduced scale]

